Autodesk®
Stone® Direct 2010

Configuration Guide

Disclaimer

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Introduction

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About This Guide

This document provides diagrams and information about connecting your workstation to your Autodesk® Stone® Direct storage. It covers the HP® workstation, as well as the XR-series storage unit.

Since a given workstation may work with various storage configurations, the diagrams are organized as two sets: a set that illustrates where to connect the fibre optic cables to your workstation, and a set that illustrates where to connect the fibre optic cables to your storage. Thus, to connect your workstation to your storage, use the two diagrams that represent your configuration: one for the workstation and one for the storage.

Audience

Basic knowledge of UNIX (or Windows® for Autodesk® Lustre® systems running under Windows), and computer hardware in a professional video/film production environment is assumed throughout this guide. Do not attempt to carry out the procedures outlined in this guide if you do not have this knowledge.

Terminology

The following terms are used throughout this guide.

Term	Description
Disk array	Global storage solution

Term	Description
Enclosure	Synonym for disk array
Unit	Synonym for disk array
XR-Series	XR enclosure, XE enclosure
XR	XR-Series RAID enclosure
XE	XR-Series expansion enclosure
EBOD	Expansion Bunch Of Disks (synonym for XE)
Loop	A workstation-to-storage fibre channel connection
Storage assembly	A storage assembly consists of one enclosure connected to your workstation, and any additional enclosures daisy-chained to that enclosure.
Stone filesystem	A UNIX kernel driver that is used to control the storage of material on a Stone Direct disk array. The Stone filesystem is optimized for managing large multimedia files.
Standard Filesystem	Any POSIX compatible filesystem recognized and mountable by the Linux® operating system.
Stone filesystem partition	A logical division of the Stone filesystem. When you configure the Stone filesystem, you decide how many partitions you will use.

Notation Conventions

A number of style conventions are used throughout this guide. These conventions and examples of their use are shown as follows.

Convention	Example
Text that you enter in a command line or terminal appears in Courier bold. You must press the Enter key after each command.	**rpm -qa**
Variable names appear in Courier, enclosed in angle brackets. No spaces are allowed in variable names.	`<variable_name>`
Variables that appear enclosed in square brackets are optional.	`[<filename>]`
Feedback from the command line or terminal appears in Courier.	`limit coredumpsize`
Directory names, filenames, URLs, and command line utilities appear in italics.	*/usr/discreet*

Commands

The Linux® operating system is case sensitive. You must type commands, file names, and pathnames exactly as they appear in this guide. For more information on the commands used when configuring hardware, refer to the online operating system documentation. In a terminal, type **man** followed by the name of the command. For example, type: **man cp** to display information on copying files.

Related Documentation

This release has documentation that helps you install, configure, and use the software. The documentation is available from your product DVD, on the Autodesk Web site, and installed with the product (as PDF files and as an HTML help system).

For a list of all the documentation available to you, consult the Latest Documentation list by visiting *http://www.autodesk.com/me-documentation*. From this page you can access the complete documentation library.

You should also refer to your product's release notes for all late-breaking release information.

Contacting Customer Support

For Autodesk Media and Entertainment Customer Support, visit *http://www.autodesk.com/support*.

Customer support is also available through your Autodesk reseller. To find a reseller near you, consult the reseller look-up database at *http://www.autodesk.com/resellers*.

Autodesk Stone Direct Storage Configurations

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Topics in this chapter:

About Stone Direct

Stone Direct is Autodesk's high-performance direct-attached storage, designed to address the different real-time playback requirements of SD, HD, 2K film, and mixed resolution workflows.

The following three components are required in a system that uses Stone Direct storage.

Component	Description
One or more disk arrays	The physical storage units
Stone filesystem or standard filesystem	The filesystem that determines how disk arrays are partitioned and media is stored on disk arrays
Visual Effects, Finishing, and Colour Grading application	The way you access the media on the disk arrays

In the simplest configuration, a Stone Direct consists of a single disk array attached using fibre channel cables to a workstation running a Visual Effects, Finishing, and Colour Grading application. More complex

configurations consist of two or more disk arrays, daisy-chained together and attached to the workstation. The capacity of each disk array varies with the number of disks it contains and the capacity of each of the disks. The capacity of the Stone Direct in turn depends on the capacity of each disk array and the number of disk arrays it contains.

Stone Direct storage is flexible and scalable. You can increase storage capacity by adding disk arrays. Note however that the Stone Direct configurations available may vary depending on the type of RAID controller used and workstation running your Visual Effects and Finishing or Lustre application. If your platform is an older generation system, refer to the *Stone Direct Configuration Guide, 7th Edition* for help determining the storage configurations currently supported on your platform.

Storage Configuration Workflow

This section presents the workflow for setting up and configuring Stone Direct storage from scratch. It is intended to provide context for the current document, and ensure that you have completed the necessary hardware setup prior to connecting your Stone Direct storage.

To set up and configure Stone Direct storage:

1 Verify that all peripheral, video and hardware components of your system are properly wired. Refer to the appropriate Hardware Setup Guide for your workstation.

2 Understand the different components of your storage configuration. See Autodesk Stone Direct Storage Configurations   on page 5.

3 Review the safety and work environment guidelines in this guide. See Safety and Work Environment Guidelines on page 11.

4 Physically connect the Stone Direct storage to your workstation using the diagrams in this guide. You use two diagrams to connect the fibre optic cables: the first illustrates the connectors on your workstation, and the second illustrates the connectors on the storage unit (or units). Refer to the appropriate diagrams for your system in Workstation Connections on page 15 and for your storage configuration in Storage Connections on page 23.

5 Power on the storage.

> **NOTE** In a hardware RAID configuration, the sequence in which you power the units on or off is important: the RAID controller must be able to detect the other units in the Stone Direct storage at all times. Thus when you power on the hardware RAID, the last unit you power on is the RAID controller. When you power off the hardware RAID, the first unit you power off is the RAID controller.

6 Power on your workstation.

7 Check the Hardware Setup Guide for your workstation as well as the Release Notes for your application for any release-specific workstation or fibre channel BIOS settings, and verify these match with those of your workstation and fibre channel adapters.

8 Configure logical volumes (LUNs) on RAID controllers using the XR configuration utility. See LUN Management Guidelines on page 35 for more information on how to proceed for your storage configuration.

9 Install your Visual Effects, Finishing, and Colour Grading application.

10 Create the filesystem used for media storage.
   - For Visual Effects and Finishing products refer to the *Stone and Wire Filesystem and Networking Guide* for your release, for help creating a Stone filesystem or standard filesystem.

   - For Lustre, refer to the installation documentation for your Lustre release.

11 Once you complete the setup of your Stone Direct storage, if you need to configure Wire® networking, refer to the *Stone and Wire Filesystem and Networking Guide*.

XR-Series Disk Array

XR-series refer to the disk arrays used to build the Stone Direct configuration. The XR-series is the new generation of storage.

XR-Series Disk Arrays

The XR-series includes the XR146, XR300, XE146, and XE300 disk array types. Each XR-series disk array contains twelve 146 GB, 300 GB, or 450GB hard drives. For technical specifications, assembly, and maintenance information, refer to the *XR/XE RAID Solution Maintenance Guide*.

RAID Strategy

Autodesk Stone and Wire uses hardware RAID (Redundant Array of Independent Disks) to provide high performance, reliability, and protection against data loss. RAID combines many hard disks into a single logical disk to obtain I/O performance levels that cannot be obtained with a single disk.

RAID operations are performed by a hardware RAID controller included in the disk array enclosure. Hardware RAID has the advantage of a dedicated CPU that substantially improves throughput and does not impact workstation performance.

Physical Enclosures

The XR- series provides two types of enclosures: a RAID enclosure and an EBOD (Expansion Bunch Of Disks) enclosure (also called an XE enclosure).

NOTE RAID and EBOD enclosures are not interchangeable. Each type of enclosure has its own firmware, Ethernet ports, fibre channel ports and expansion ports (EBOD enclosures use Serial Attached SCSI (SAS) expansion ports). Also, you cannot mix and match enclosures with different disk sizes; all disks in all enclosures in a storage configuration must be of the same size, series, and firmware.

Hardware RAID storage configurations require either one RAID enclosure (for 2-loop) or up to two RAID enclosures (for 4-loop). These configurations may include additional XE (XR-series) expansion enclosures. RAID enclosures contain hardware RAID controllers. The RAID enclosure or enclosures perform RAID operations for all enclosures in the configuration.

The following illustrations show the XR-series RAID using the F6412E RAID controller and EBOD enclosures. The F6412E RAID controller is used with the HP xw8600 and HP z800 Workstations only.

XR RAID Enclosure with F6412E RAID Controller

Hardware RAID Controllers

Battery Backup Units
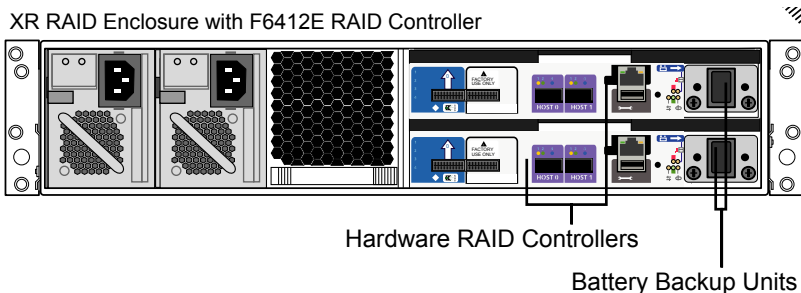
XE (EBOD) Expansion Enclosure (used with F6412E RAID Controller)
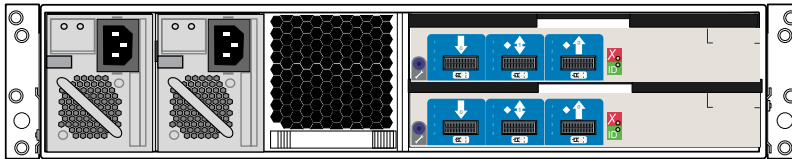
The following illustrations show the XR-series RAID using the F5412E or F5402E RAID controllers and an EBOD enclosure that is used with both. An XR RAID enclosure using the F5412E or F5402E RAID controller can be used with all supported workstations.

XR RAID Enclosure with F5412E RAID Controller

Hardware RAID Controllers

Battery Backup Units
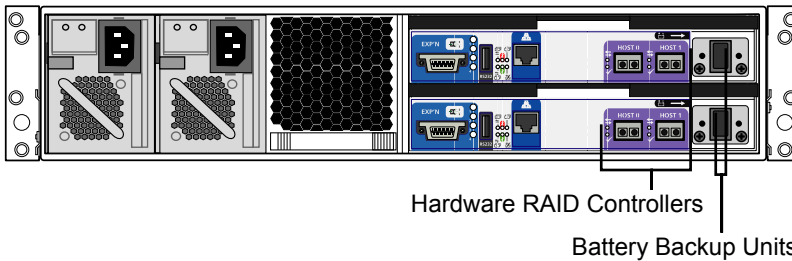
XR RAID Enclosure with F5402E RAID Controller

Hardware RAID Controllers

Battery Backup Units
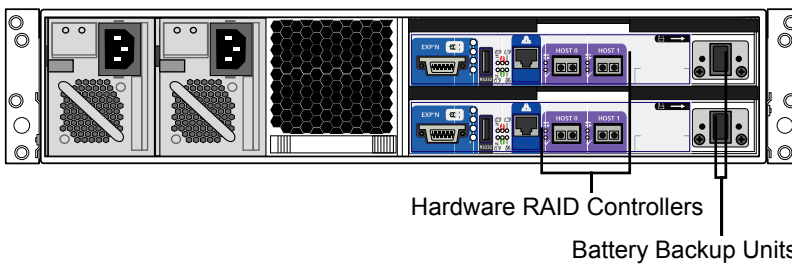
XE (EBOD) Expansion Enclosure (used with F5412E or F5402E RAID Controller)
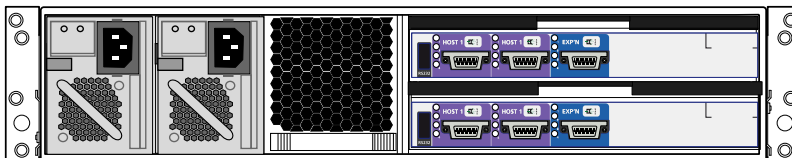
XR-Series Storage Power and Air Conditioning Requirements

The following table summarizes the power consumed by XR-series storage solutions and the heat they can generate from continuous access by your application. For detailed specifications, including noise output, see the documentation provided by the manufacturer.

Component	Quantity	Startup Amps (120V / 240V)	Cont' Amps (120V / 240V)	Watts	Heat (BTUs)
XR RAID Enclosure	1	5.5 / 2.8	3.0 / 1.5	360	1228.68
XE Expansion Enclosure	1	5.5 / 2.8	2.5 / 1.3	300	1228.68
XR RAID with 1 XE	-	11 / 5.5	5.5 / 2.8	660	2252.58
XR RAID with 2 XE	-	16.5 / 8.3	8.0 / 4.0	960	3276.48

You must be able to meet the startup power requirements and have a climate control system with the capacity to maintain the temperature of these components during continuous access. Refer to the following table for standard conversion benchmarks and an example of how they are used to establish climate control requirements.

Unit Conversion	Example
1 Watt = 3.413 BTU	360 Watts = 1228.68 BTU
12000 BTU = 1 Ton of air conditioning	1228.68 BTU = 1.024 Ton of air conditioning

Safety and Work Environment Guidelines

3

Topics in this chapter:

About These Guidelines

This chapter presents essential precautions you should review prior to installing and configuring your Stone Direct storage. These considerations and site preparations will help ensure a safe installation.

WARNING All safety and work environment guidelines presented in this chapter relate to Stone Direct disk arrays only and do not replace or modify guidelines or requirements set by the manufacturers of the workstation or of the peripheral devices attached to your system.

Setting Up Your Work Site and Handling Storage Hardware

Guidelines for setting up your workspace and handling your storage hardware are included in the documentation for your disk array.

For XR-series disk arrays, refer to Chapter 2, "Getting Started" in the *XR/XE RAID Solution Maintenance Guide*.

Establishing Ideal Environmental Conditions

The following guidelines describe the ideal environmental conditions for your disk array to function properly. Ensure these conditions are met:

■ Room temperature and ambient humidity are at acceptable levels.

■ The disk array is at room temperature before operating.

■ The environment is clean and dust-free.

■ Disk array fans are not obstructed. Do not drape anything, such as a jacket or blanket, over any part of the system.

■ There is good air circulation.

■ The environment has minimal vibration and humidity.

■ Electromagnetic noise is minimal by separating digital data and power cables from analog audio cables and running them in different cable ducts.

■ The power requirements of the system are met by your electrical installation.

■ Any cable ties you use to bundle cables together are slack enough to prevent damage to the wires inside the cables, and any loops in optical cables are relaxed enough to prevent damage to the optical fibres inside the cables (for example, no smaller than two centimeters in diameter). Damage to wires or optical fibres can render cables unstable or completely unusable.

Avoiding Electrostatic Discharge

By eliminating the possibility of electrostatic discharge, you ensure a safe work environment. As well, disk array components are less likely to be damaged. The following safety guidelines minimize the possibility of electrostatic discharge.

■ Power your system on and off according to the procedures in the section Powering Up and Down on page 12.

■ Using a grounded static wrist strap, attach the strap's alligator clip to any grounded metal surface on the disk array enclosure and place the wristband on your wrist.

■ Stand on a conductive rubber mat.

■ Do not handle the boards for the disk arrays or workstations unnecessarily.

■ Read and observe warning labels on enclosures and drives.

■ Call Customer Support for repair/replacement of disk drives or circuitry within the enclosure by using one of the methods listed in Contacting Customer Support on page 3.

NOTE The power supplies for all Stone Direct disk arrays are universal, and therefore automatically detect the correct voltage for your country.

Powering Up and Down

Powering your system up or down should be done in a proper sequence. This will ensure that the system functions properly.

WARNING It is critical that you follow the correct sequence when powering your system up and down to ensure proper operation of the storage configuration. An incorrect sequence can mean your system does not recognize all drives.

To power up your system:

1 Power up all disk arrays.

   Power on the RAID controller units last. This ensures the RAID controllers detect the other units in the Stone Direct storage.

2 Wait about 90 seconds for all the drives to spin up.

3 Power up your workstation.

To power down your system:

1 Power down your workstation. If you are on a Linux system, in a Terminal, as root, type:

   shutdown -g0

2 Wait for your workstation to shut down completely and power off. If the system does not power off automatically, power it off manually.

3 Power down your disk arrays.

   Power off the RAID units first. This ensures the RAID controllers can always detect the other units in the Stone Direct storage.

Workstation Connections

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Topics in this chapter:

Understanding the Diagrams

The diagrams in this chapter illustrate the fibre channel connections on the back panel of the workstation, and the corresponding connection on the storage enclosure. Note the following about the diagrams:

■ If both 2-loop and 4-loop configurations are available for a workstation, both are illustrated in the same diagram. If you are configuring a 2-loop configuration, ignore the connections for the second storage assembly. For an explanation of 2-loop and 4-loop configurations, and "first storage assembly" and "second storage assembly" references, see About 2-Loop and 4-Loop Configurations on page 23.

■ Labels for fibre channel ports correspond to the default port numbers assigned by the operating system. For example, on a 4-port fibre channel adapter, the left-most port is port 1 and the right-most port is port 4; the corresponding labels on the diagram are "FC Loop 1" and "FC Loop 4".

■ The diagrams in this chapter illustrate only one fibre channel adapter or fibre channel adapter combination per workstation. In cases where the diagram does not reflect your fibre channel adapter configuration, refer to Cabling for 2- and 4-Port Fibre Channel Adapters on page 16 to determine which ports to connect to storage.

Cabling for 2- and 4-Port Fibre Channel Adapters

Workstations may be equipped with either or both 2-port and 4-port fibre channel adapters, depending on the storage configurations available for that workstation. If the diagram for your workstation does not reflect your fibre channel adapter configuration, use the following to determine which ports to connect to storage:

■ If the diagram illustrates a 4-port adapter and yours is a 2-port adapter, the illustration should show connections for only the two innermost ports of the four ports. Ignore the two outermost ports and cable according to the two innermost ports.

■ If the diagram illustrates a 2-port adapter, and yours is a 4-port adapter, connect the two innermost ports to Stone Direct storage as indicated in the following diagram. Note that with a 4-port adapter you can connect the two outermost ports to archiving devices, or to a Storage Area Network (SAN) system. Depending on your configuration, it may also be possible to connect all four ports to a SAN.
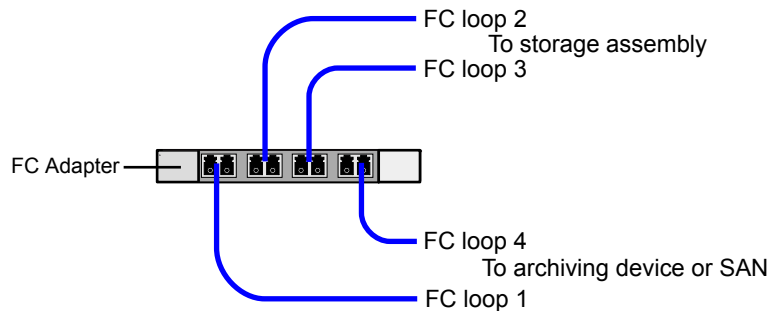
Terminating 4-Port Fibre Channel Adapters

If you are not using the two outermost ports of a 4-port fibre channel adapter, it is recommended that you terminate these ports using the FC loopback couplers that shipped with your system. Terminating these ports significantly decreases the time required to boot the system.

HP z800

The following diagram illustrates 2-loop and optional 4-loop connections for the HP z800 workstation. The same diagram can be used for the Lustre Media Server.

NOTE Terminate unused ports on a 4-port adapter using FC loopback couplers.

(Optional) To archiving device or SAN

FC loop 2
FC loop 3 } To storage assembly

FC loop 4
FC loop 1 } (Optional) To storage (4 loop), archiving device or SAN
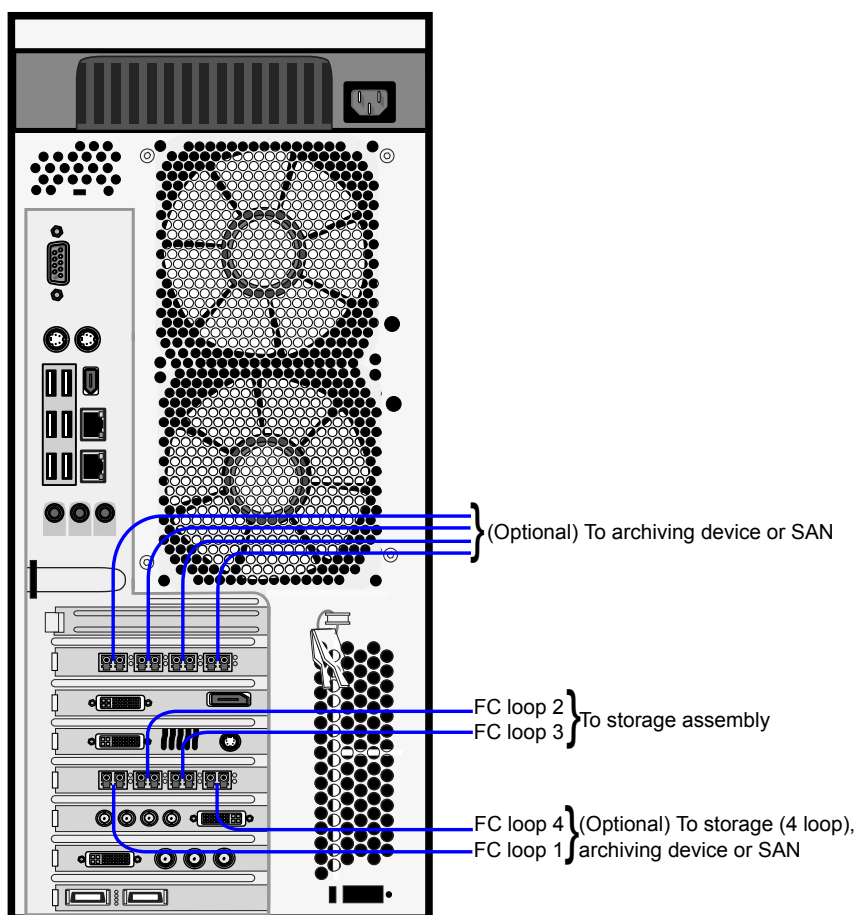
HP xw8600

The following diagram illustrates 2-loop and optional 4-loop connections for the HP xw8600 workstation. The same diagram can be used for the Lustre Media Server.

NOTE Terminate unused ports on a 4-port adapter using FC loopback couplers.

FC loop 3 } To storage assembly
FC loop 2

FC loop 1 } (Optional) To storage (4 loop),
FC loop 4 archiving device or SAN

(Optional): To archiving device or SAN
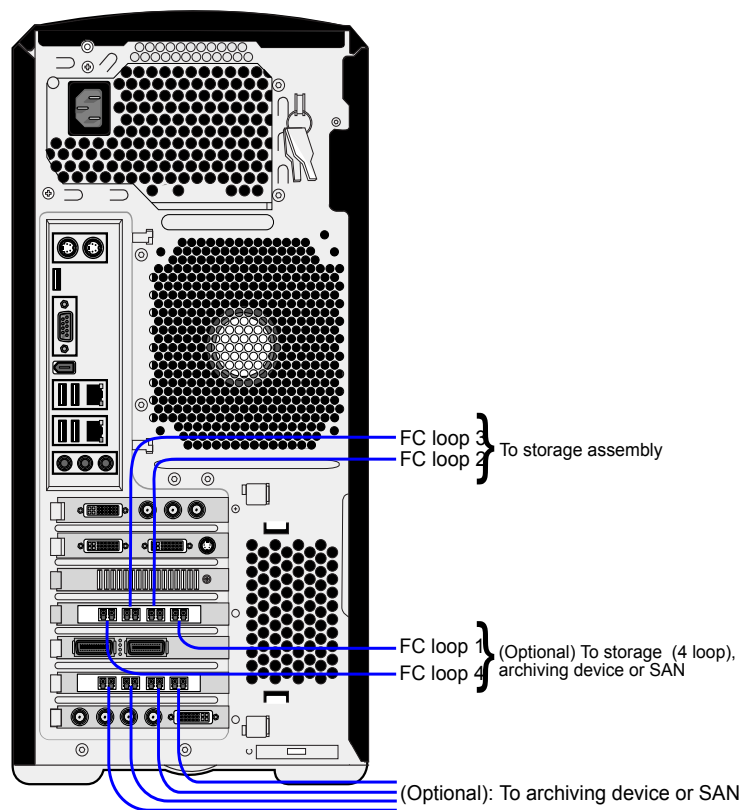
HP xw9400

The first of the following diagrams illustrates 2-loop and optional 4-loop connections for a Visual Effects and Finishing configuration running on the HP xw9400 workstation. The second diagram illustrates 2-loop and optional 4-loop connections for a Lustre Media Server running on the HP xw9400 workstation.

NOTE Terminate unused ports on a 4-port adapter using FC loopback couplers.

HP xw9400 Workstation
Visual Effects and Finishing

FC loop 1
FC loop 4

(Optional)
To second storage assembly,
archiving device or SAN

ATTO Celerity FC-44ES
FC adapter

FC loop 3
FC loop 2

To first storage assembly
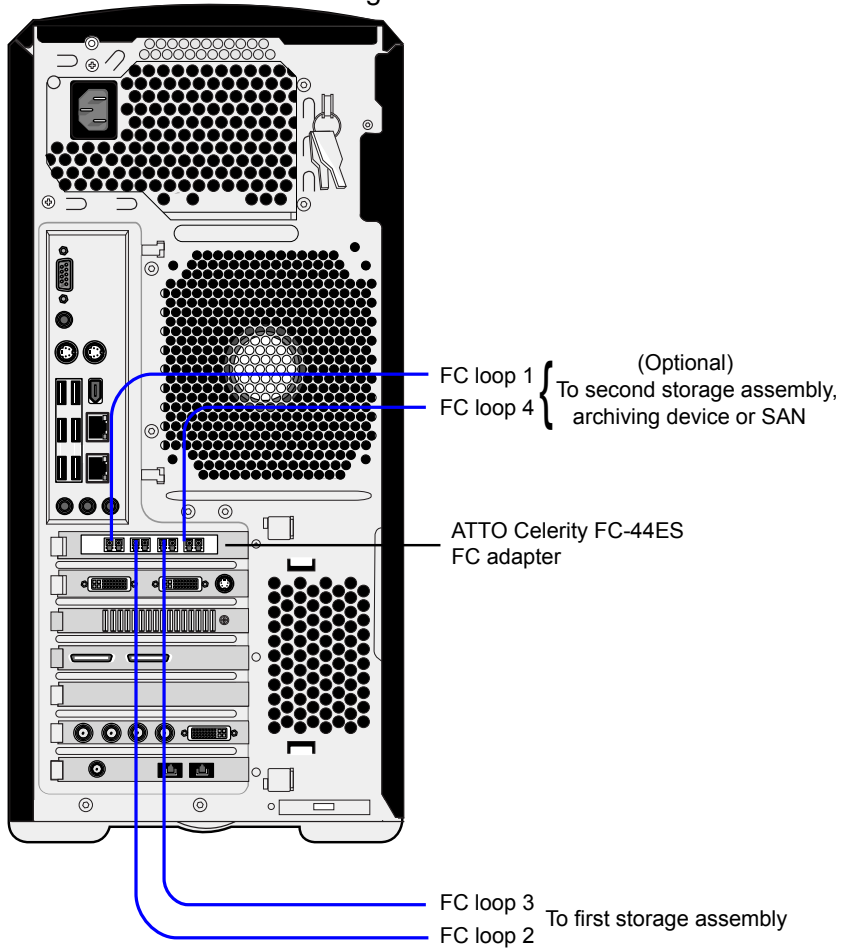
HP xw9400 Workstation
Incinerator Lustre Media Server

FC loop 1 — (Optional)
FC loop 4 — To second storage assembly

ATTO Celerity FC-44ES FC adapter

FC loop 3 — To first storage assembly
FC loop 2

ATTO Celerity FC-44ES FC adapter

(Optional)
To archiving device or SAN
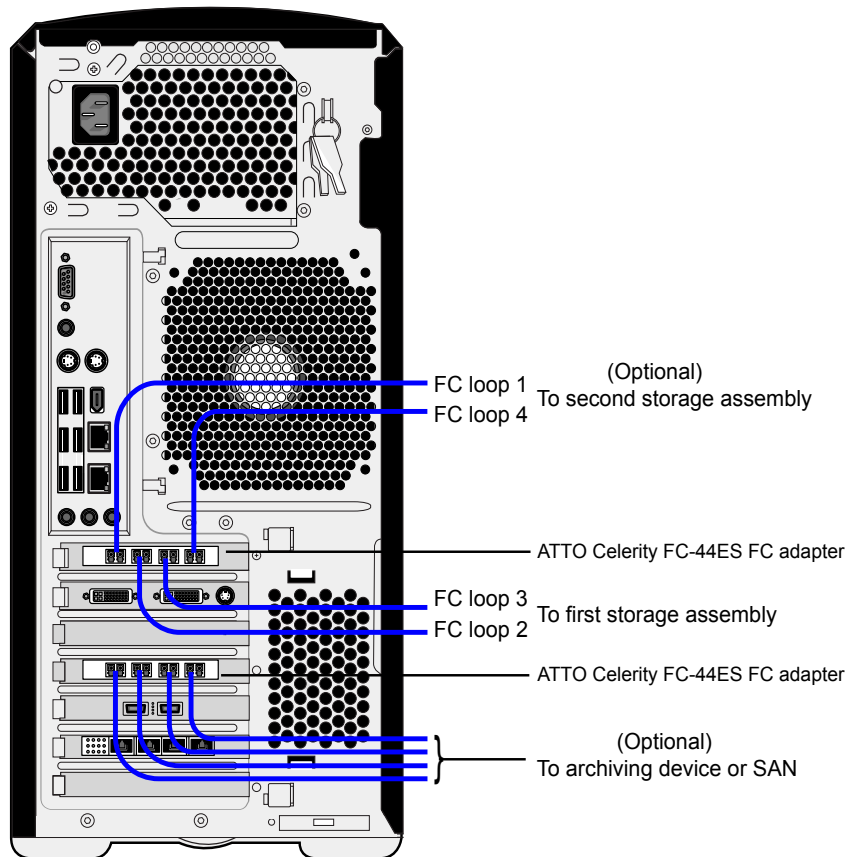
HP xw8400

The following diagrams illustrate 2-loop (and optional 4-loop) connections for a Lustre (Windows) configuration on the HP xw8400 workstation.

NOTE Terminate unused ports on a 4-port adapter using FC loopback couplers.

HP xw8400 Workstation
Lustre (Windows Configuration)

FC loop 1
FC loop 4

(Optional)
To second storage assembly,
archiving device or SAN

ATTO FC-44ES
FC adapter

FC loop 3
FC loop 2

To first storage assembly
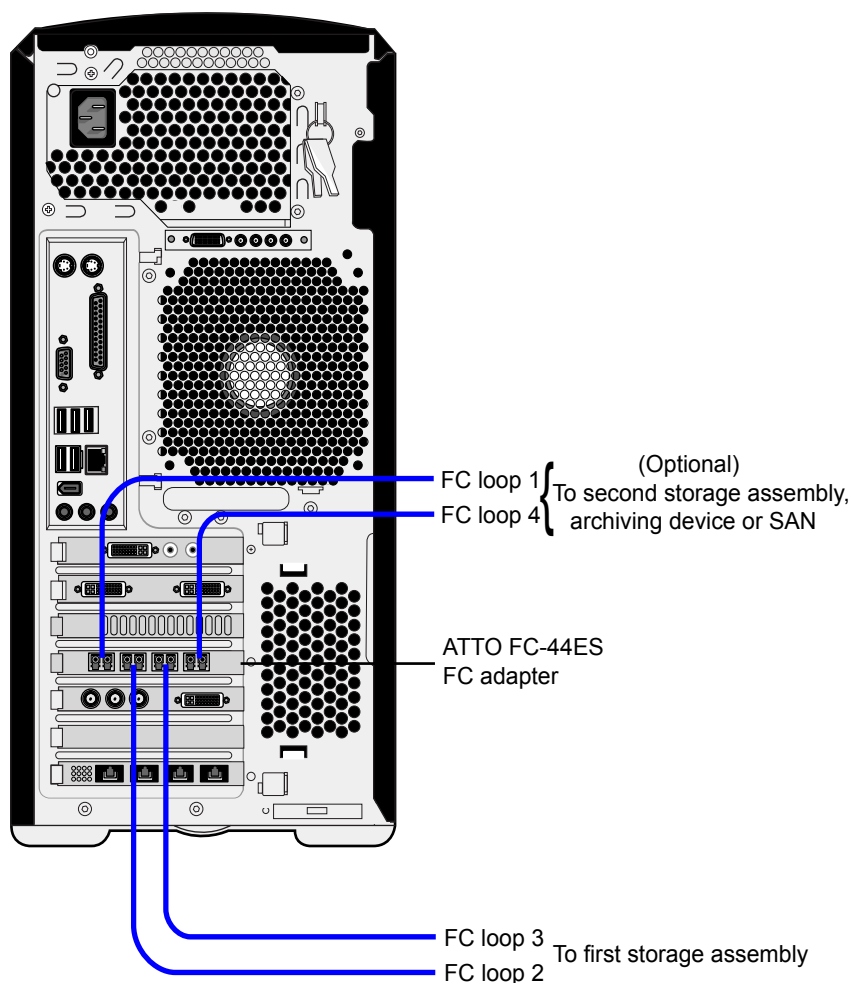
NOTE HP xw8400 workstations running Lustre (Linux) with Autodesk Incinerator® do not support direct attached storage.

Storage Connections

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About 2-Loop and 4-Loop Configurations

A storage assembly consists of the enclosure directly connected to your workstation, and any additional enclosures daisy-chained to that enclosure. Each workstation-to-storage fibre channel connection is referred to as a "loop". A 2-loop configuration consists of one storage assembly. A 4-loop configuration consists of two storage assemblies unless using the F6412E RAID controller, which uses one storage assembly.

The diagrams using F5402E or F5412E RAID controllers in this guide refer to "first" and "second" storage assembly. In a 2-loop configuration, "first" storage assembly refers to the only one in the configuration. In a 4-loop configuration, the "first" storage assembly is the one on the left of the diagram, and the "second" is the one on the right.

NOTE It is important to cable exactly as illustrated in the diagrams and explained in the text to ensure storage functions properly. For example, do not reverse fibre channel connections for first and second enclosures, or reverse individual workstation-to-storage connections.

The following diagram summarizes the information in this section.

First storage assembly   Second storage assembly

To FC adapter on workstation
To FC adapter on workstation
XR RAID Enclosure

To FC adapter on workstation
To FC adapter on workstation
XR RAID Enclosure

Enclosure
connected
to workstation

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

Additional
enclosures

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

2-loop configuration

4-loop configuration

XR-Series Storage Connections

The XR-series provides both 2-loop and 4-loop hardware RAID configurations.

2-Loop Hardware RAID Configurations

This diagram illustrates how to cable a 2-loop hardware RAID storage configuration. Solid lines represent cabling for the simplest 2-loop configuration (a single RAID enclosure). Dotted lines represent cabling for additional enclosures (up to four EBOD enclosures). The table below the diagram lists the hardware you need to cable different sizes of this storage configuration.

NOTE Although the diagram displays an XR RAID enclosure with F5412E RAID controllers and corresponding XE (EBOD) expansion enclosures, the concept of wiring would be the same if using an XR RAID enclosure with F6412E RAID controllers.

To FC adapter on workstation

To FC adapter on workstation

XR RAID Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

- - - Cabling for additional enclosures
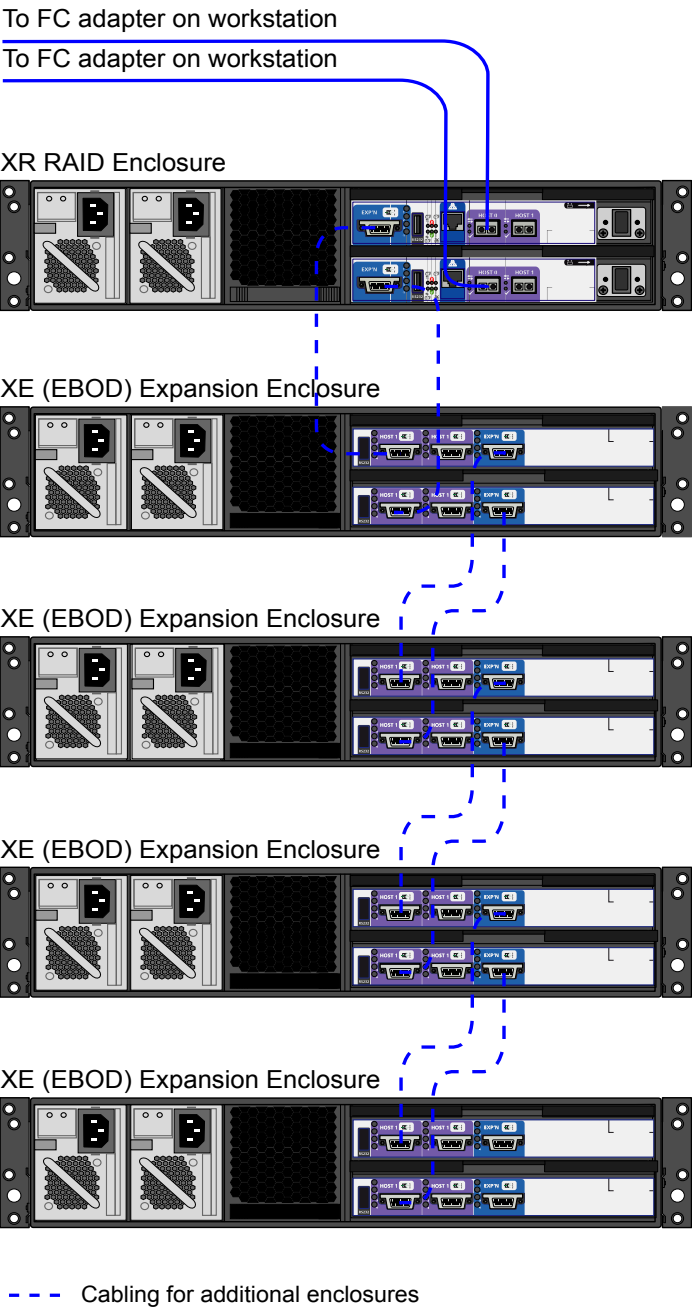
NOTE A 2-loop configuration using the F5402E and F5412E RAID controllers supports a maximum of four expansion enclosures. The F6412E RAID controller supports a maximum of seven expansion enclosures.

Number of RAID Units	Number of XE (EBOD) Expansion Units	Number of fibre optic LC cables	Number of SFP transceiver modules LC	Number of SFP 0.5 m inter-chassis cables
F5402E, F5414E, and F6412E RAID Controllers				
1	0	2	2	0
1	1	2	2	2

Number of RAID Units	Number of XE (EBOD) Expansion Units	Number of fibre optic LC cables	Number of SFP transceiver modules LC	Number of SFP 0.5 m inter-chassis cables
1	2	2	2	4
1	3	2	2	6
1	4	2	2	8
F6412E Controller only				
1	5	2	2	10
1	6	2	2	12
1	7	2	2	14

NOTE When using two ATTO cards the first ATTO card is be connected to local storage and the second optional ATTO card to a SAN and/or archiving device.

NOTE 4 Gb storage configurations require 4 Gb SFP transceivers. A label on 4 Gb SFP transceivers differentiates them from 2 Gb transceivers (which do not have labels). Mixing 2 Gb SPFP tranceivers with 4 Gb SFP transceivers may cause unpredictable results.

4-Loop Hardware RAID Configurations

These diagrams illustrate how to cable enclosures in a 4-loop hardware RAID storage configuration.

■ The first illustrates the cabling when using an XR RAID enclosure with F6412E RAID controllers.

■ The second illustrates the cabling for all other 4-loop configurations.

In the diagrams, solid lines represent cabling for the simplest 4-loop configuration and dotted lines represent cabling for additional enclosures. In 4-loop configurations with two storage assemblies, you can have either two or four additional enclosures.

The table after the diagrams lists the hardware you need to cable different sizes of this storage configuration.

To FC adapter on workstation

To FC adapter on workstation

To FC adapter on workstation

To FC adapter on workstation

XR RAID Enclosure (F6412E)

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

– – – Cabling for additional enclosures

First storage assembly

Second storage assembly

To FC adapter on workstation
To FC adapter on workstation

To FC adapter on workstation
To FC adapter on workstation

XR RAID Enclosure

XR RAID Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

XE (EBOD) Expansion Enclosure

– – Cabling for additional enclosures

NOTE A 4-loop configuration for Visual Effects and Finishing systems supports a maximum of two expansion enclosures per RAID controller. A 4-loop configuration for Lustre (Windows) or Incinerator supports a maximum of four expansion enclosures per RAID controller.
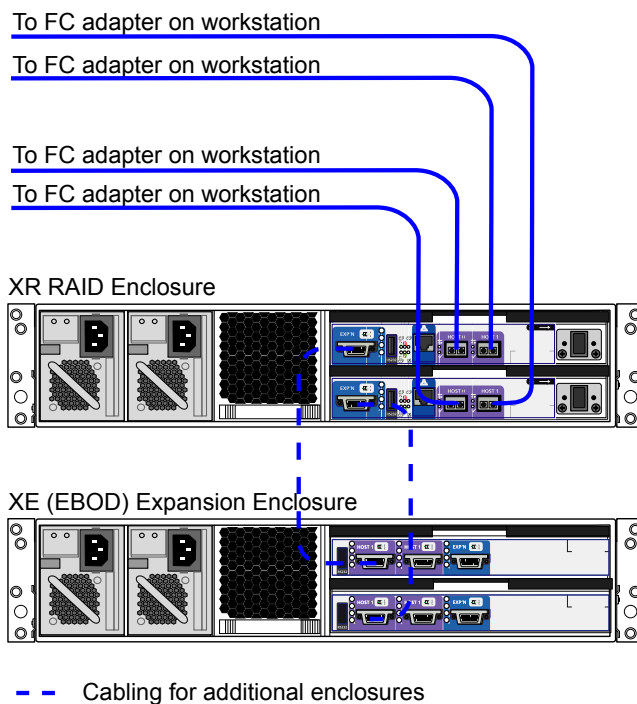
To FC adapter on workstation

To FC adapter on workstation

To FC adapter on workstation

To FC adapter on workstation

XR RAID Enclosure

XE (EBOD) Expansion Enclosure

– – Cabling for additional enclosures

Number of RAID Units	Number of XE (EBOD) Expansion Units	Number of fibre optic LC cables	Number of SFP transceiver modules LC	Number of SFP 0.5 m inter-chassis cables
F5402E and F5414E RAID Controllers				
2	0	4	4	0
2	2	4	4	2

Number of RAID Units	Number of XE (EBOD) Expansion Units	Number of fibre optic LC cables	Number of SFP transceiver modules LC	Number of SFP 0.5 m inter-chassis cables
2	4	4	4	4
F6412E RAID Controller only				
1	1	4	4	2
1	3	4	4	6
1	5	4	4	10
1	7	4	4	14

NOTE 4 Gb storage configurations require 4 Gb SFP transceivers. A 4 Gb SFP transceiver is differentiated from a 2 Gb transceiver by its label, which is not present on the 2 Gb transceiver.

Disconnecting and Reconnecting Storage

After you configure your storage, you must ensure that cable connections do not change. If you must disconnect storage at any time, be sure to note which cables connect to which ports prior to disconnecting the cables so that you can re-establish the correct connections.

Internal Storage Connections

<div style="text-align: right; font-size: 3em; font-weight: bold">6</div>

Topics in this chapter:

About Internal Storage

This chapter describes how to connect internal storage on workstations that support internal storage. Only Autodesk-supplied hard disks can be used for internal storage.

WARNING Connecting internal storage requires work inside the workstation enclosure. Wear a grounding strap to ensure you do not inadvertently damage components as you work inside the enclosure. Also, Internal drives require adequate ventilation, always close the side cover of the workstation before you boot the system.

I/O and Playback Limitations

The following limitation applies to internal storage configurations.

Platform	I/O	Playback Limitation
HP 8400	SD, HD	Single-stream HD only (no cross-dissolve in Autodesk® Smoke®)

Setting Up Internal Storage

After you install your Visual Effects and Finishing application on the workstation, use the Stone and Wire *sw_config* utility to set up the Stone filesystem and manage the internal storage on the workstation. For information about this utility, see the latest *Stone and Wire Filesystem and Networking Guide*.

Protecting Data on Internal Storage

You normally protect data on a Stone filesystem using hardware RAID. However, these features are not available for workstations using the internal storage configuration. Because disk failure may result in media loss, apply the following recommendations to protect media while working on the workstation:

■ Do not store critical or long-term projects on the internal storage of the workstation.

■ Ensure media used in projects is backed up and can be recaptured, if necessary.

■ Save projects and project archives to a network drive that is backed up on a regular basis.

HP 8400

Internal storage is available on the HP 8400 workstation. The internal storage configuration uses four 300 GB Serial Attached SCSI (SAS) storage disks inside the system enclosure. These disks are connected to a SAS adapter separate from the system disk. The system disk is a Serial Advanced Technology Attachment (SATA) disk.

NOTE Unique SAS identification numbers are automatically assigned to the hard disks used for internal storage. It is not necessary to set jumpers on SAS hard disks.

System Disk

SATA Adapter

Terminator

Ribbon cable

300 GB Storage Disk

SAS ID 1

300 GB Storage Disk

SAS ID 0

SAS Adapter 1:
-2 data drives
-300 GB each

SAS Adapter 1

SAS Adapter 2:
-2 data drives
-300 GB each

SAS Adapter 2

SAS ID 0

300 GB Storage Disk

SAS ID 1

300 GB Storage Disk

Ribbon cable

Terminator
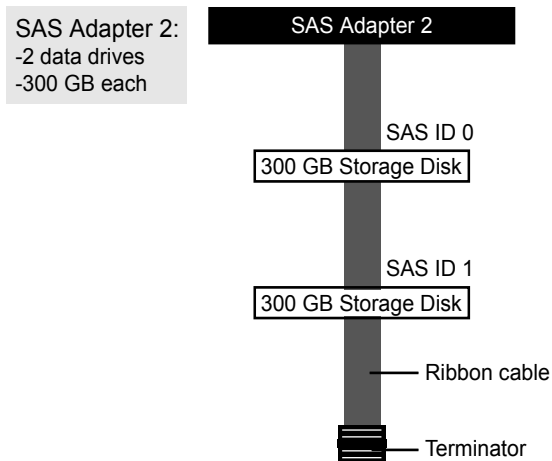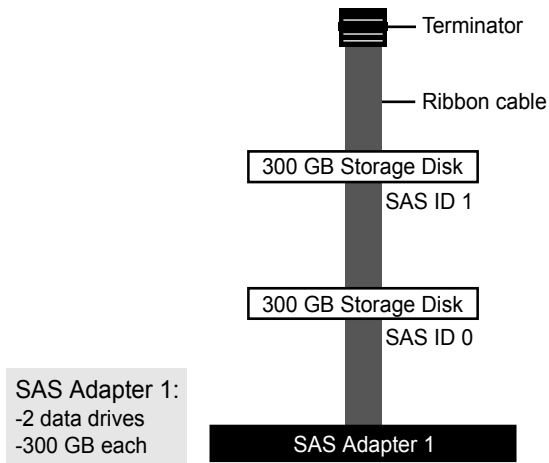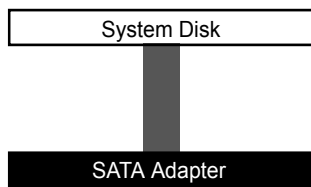
LUN Management Guidelines

7

Topics in this chapter:

About LUN Configuration

The first step after connecting new storage to your workstation is to configure logical volumes (LUNs).

- If this is a first time setup of the RAID controllers for XR-series storage, refer to Connecting to the RAID Controller for the First Time on page 38.

- If your RAID controller is already connected and configured to your network, then proceed to XR-Series LUN Creation Using the XR Configuration Utility on page 36.

  NOTE RAID configurations are designed and tested by Autodesk to provide optimal performance for media playback on your workstation. Although the RAID management utility (Stone Storage Manager for the XR-series) lets you customize LUN configuration manually, deviating from the documented LUN configuration processes contained in the chapter is not supported.

Once the LUNs are created and configured, you must create a filesystem on your storage. See the application installation and configuration guide for details.

XR-Series LUN Creation Using the XR Configuration Utility

To create the LUNs on your XR-series storage, you must use the XR configuration utility that automates the LUN creation process.

The XR configuration utility is used with either Visual Effects and Finishing systems installed on Red Hat Enterprise Linux or Lustre systems installed on Windows XP SP1.

NOTE Although XR-series LUN creation is now performed by the XR configuration utility, you can monitor the LUN creation process by accessing the RAID controllers and launching the Stone Storage Manager (SSM) RAID management utility. To launch SSM, refer to Accessing the RAID Controllers. However, it is not necessary to launch SSM for LUN configuration using the XR configuration utility.

Configuring LUNs with the XR Configuration Utility

The procedure in this section configures LUNs on XR-series storage for the following system types.

Filesystem	Application(s)	Platform
XFS	Autodesk® Inferno®, Flame®, Flint®, Smoke 2008 and above	Linux
XFS	Autodesk Lustre Incinerator LMS/AMS 2007 and above	Linux
NTFS	Autodesk Lustre 2007 and above	Windows
Stone FS	Autodesk® Inferno®, Flame®, Flint®, Smoke 2007 and above **NOTE** Stone FS is not supported on Red Hat Enterprise Linux 5	Linux, up to RHEL WS 4u3

NOTE For systems having 2XR or 2XR + 2XE, you have to configure one XR at a time with the XR Configuration Utility. Connect the first XR and use the utility to configure. When done, disconnect the first XR and connect the second XR. When the second XR is configured re-connect the two XRs.

To configure LUNs on XR-series storage:

1 Download the latest XR Configuration Utility from the Autodesk FTP site:
ftp://ftp.discreet.com/pub1/release/Utilities/XR_Configurator_v1.4.zip

2 Unzip the file locally to your workstation.

3 Open a command line interface:

■ On a Linux system, open a Terminal.

■ On a Windows system, open a Command Prompt.

4 In the Terminal or Command Prompt, launch the LUN configuration utility.

On Linux, go to the */XR_Configurator* directory where the file was unzipped and type:

`./XR_config.pl`

On Windows, go to the *\XR_Configurator* directory where the file unzipped and type:

`XR_config.exe`

The script determines the operating system of the workstation on which it is running and detects whether a LUN configuration exists on the storage attached to that workstation.

5 If a LUN configuration already exists on the storage, you are prompted for confirmation to overwrite that configuration.

> **WARNING** LUN configuration is destructive. Make sure you want to overwrite an existing configuration before you confirm.

6 After the script detects the number of enclosures and drives, it prompts you to indicate the filesystem your storage configuration uses. Use the following table to determine the number to enter.

Enter:	To select:
0	Clear Configuration
1	Stone FS: Stone FS for NON CXFS-Attached Visual Effects and Finishing Workstation. (StoneFS DAS only) (4096B sector size)
2	Others: Stone FS for CXFS-Attached Visual Effects and Finishing Workstation. (StoneFS DAS to be connected to a SAN) (512B sector size) XFS for NON CFXS-Attached Visual Effects and Finishing Workstation. (XFS DAS) (512B sector size) XFS for Incinerator Lustre Media Server. (XFS DAS) (512B sector size) XFS for Lustre Linux Workstation. (XFS DAS) (512B sector size) NTFS for Lustre Windows Workstation. (NTFS DAS) (512B sector size)
x	Exit Configuration Utility

The XR configuration utility will exit without configuring your storage if any of the following parameters are detected:

■ An incorrect number of disks. The total number of disks must be a multiple of 12.

■ Each enclosure must have the correct firmware.

■ In a dual RAID enclosure environment, there must be an equal number of expansion chassis on each RAID enclosure. The script would have to be run with a single RAID enclosure connected at a time.

If the XR configuration utility encounters any of these parameters, it will exit.

Rescanning New LUNs from the Host Operating System

Newly-created LUNs must be rescanned by the host operating system to associate the proper disk devices with each LUN.

To rescan LUNs:

1 Reboot the system.

2 To verify the new LUNs were detected, examine the content of the file */proc/scsi/scsi*.

3 You can also see the current configuration by using the following command:

```
./XR_config.pl -status
```

Accessing the RAID Controllers

If your RAID controller is already connected and configured on your local network, you can launch the Stone Storage Manager RAID management utility by pointing a Web browser (Internet Explorer, Firefox®, etc.) to *http://<ip adress>:9292*.

If your RAID controller is not yet connected and configured on your local network, see

Connecting to the RAID Controller for the First Time

Before you can connect to the RAID controller on your local network for the first time, you must set or change its IP address. Each of the two RAID controllers in an XR RAID enclosure has its own IP address; you can configure LUNs by connecting to either of the two. The factory default IP address of RAID controller 0 (the bottom controller) is 10.1.1.5. For RAID controller 1 (the top controller) the factory default IP address is 10.1.1.6.

Connect the second Ethernet port on your workstation to the Ethernet port of RAID controller 0 (you may require a twisted pair cat5 cable).

Then set the second Ethernet interface on your workstation to 10.1.1.x.

Launch the Stone Storage Manager RAID management utility by pointing a Web browser at the IP address of the RAID controller, from your workstation. For example: `firefox http://10.1.1.5:9292`.

Setting the IP Address of the Controller

Once you are in Stone Storage Manager, you can change its IP address to one that is consistent with your local network.

To set the IP address of the controller:

1 In the Stone Storage Manager, click Settings.
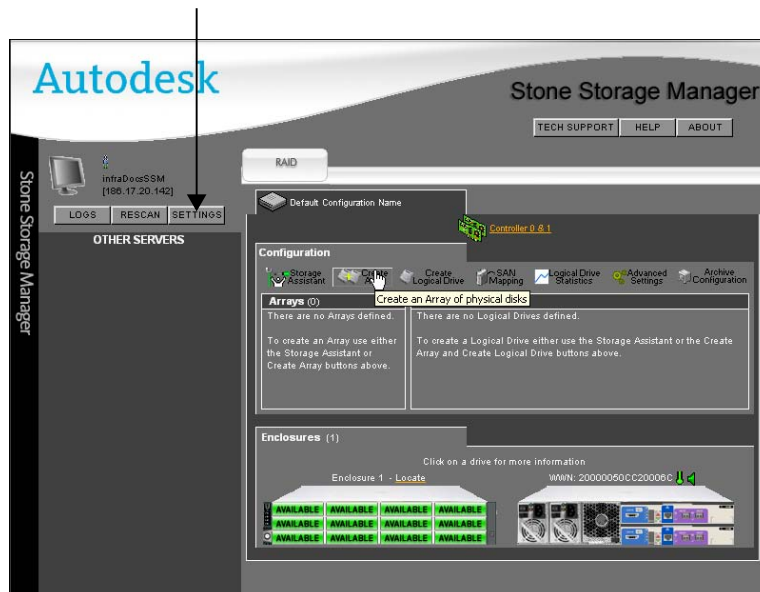
2 Select the Preferences tab.

3 Enter hostname and IP information and click APPLY.

Recommended Inode
Ratios for XR-Series

A
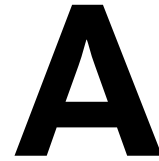
Topics in this chapter:

About This Appendix

NOTE This appendix applies to the Stone filesystem only. The new HP z800 workstations running under Red Hat Enterprise Linux 5 do not support Stone FS storage.

The tables in this appendix provide recommended inode ratios for single resolution workflows on XR-series storage. If you are using a mixed resolution workflow with XR-series storage, use the inode value for the lowest resolution. For example, if you use NTSC and HD resolutions in your workflows, use the inode ratio value for NTSC.

About Inodes and Inode Ratios

An inode is a data structure that holds information about a single frame stored in a Stone partition. Each frame in your clip library is identified by a single inode in the Stone partition.

When you set up your Stone filesystem, you must enter an inode ratio that is used to calculate the total number of inodes available per Stone partition. For example, you might have one inode for every 2048 KB of filesystem space. If you have an 8TB filesystem, this would provide you with 4 million inodes, and therefore, the possibility of storing 4 million frames.

The default inode ratio is 2048. The minimum value is 512 and the maximum value is 6656. The inode ratio is rounded up to the nearest 512 KB multiple (i.e. 513 rounds up to 1024). Generally, the number of inodes is related to the frame size of your most common production format and the size of your Stone partition.

NOTE The maximum size of a Stone filesystem is 8 terabytes.

For help entering the inode ratio parameter during storage configuration, refer to the chapter "Creating the Stone Filesystem" in the *Stone and Wire Filesystem and Networking Guide*.

Recommended Inode Ratios for 146 GB Drives

The tables in this section provide inode ratio information for XR-series arrays with 146 GB drives.

NTSC Workflows

The values in this table are for NTSC 10-bit workflows with a frame size of 1399680 bytes at 30 fps.

	Single XR Enclosure	+ 1 XE Expansion Enclosure	+ 2 XE Expansion Enclosures	+ 3 XE Expansion Enclosures	+ 4 XE Expansion Enclosures
Usable space (GB)	1367.4	2734.8	4102.2	Not supported	Not supported
Recommended inode ratio	1024	1024	1024	Not supported	Not supported
Hours of footage (hh:mm)	9:42	19:25	29:08	Not supported	Not supported

HD Workflows

The values in this table are for 1080i 10-bit HD workflows with a frame size of 8294400 bytes at 30 fps.

	Single XR Enclosure	+ 1 XE Expansion Enclosure	+ 2 XE Expansion Enclosures	+ 3 XE Expansion Enclosures	+ 4 XE Expansion Enclosures
Usable space (GB)	1367.4	2734.8	4102.2	5469.6	6837.0
Recommended inode ratio	2560	3072	3072	3072	3072
Hours of footage (hh:mm)	1:38	3:16	4:55	6:33	8:12

2K Film Workflows

The values in this table are for 2K 10-bit workflows with a frame size of 12746752 bytes at 24 fps.

	Single XR Enclosure	+ 1 XE Expansion Enclosure	+ 2 XE Expansion Enclosures	+ 3 XE Expansion Enclosures	+ 4 XE Expansion Enclosures
Usable space (GB)	1367.4	2734.8	4102.2	5469.6	6837.0
Recommended inode ratio	4096	4096	4096	4608	4608
Hours of footage (hh:mm)	1:19	2:40	4:00	5:19	6:40

4K Film Workflows

The values in this table are for 4K 10-bit workflows with a frame size of 50899872 bytes at 24 fps.

	2 XR Enclosures	+ 2 XE Expansion Enclosure	+ 4 XE Expansion Enclosures	+ 6 XE Expansion Enclosures	+ 8 XE Expansion Enclosures
Usable space (GB)	2734.8	5469.6	8204.4	10939.2	13674.0
Recommended inode ratio	6144	6144	6144	6144	6144
Hours of footage (hh:mm)	0:40	1:20	2:00	2:40	3:20

Recommended Inode Ratios for 300 GB Drives

The tables in this section provide inode ratio information for XR-series arrays with 300 GB drives.

NTSC Workflows

The values in this table are for NTSC 10-bit workflows with a frame size of 1399680 bytes at 30 fps.

	Single XR Enclosure	+ 1 XE Expansion Enclosure	+ 2 XE Expansion Enclosures	+ 3 XE Expansion Enclosures	+ 4 XE Expansion Enclosures
Usable space (GB)	2764.48	5528.96	8293.44	Not supported	Not supported
Recommended inode ratio	1024	1536	2560	Not supported	Not supported
Number of frames	2118594	3774438	3396994	Not supported	Not supported
Hours of footage (hh:mm)	19:37	34:57	31:27	Not supported	Not supported

HD Workflows

The values in this table are for 1080i 10-bit HD workflows with a frame size of 8294400 bytes at 30 fps.

	Single XR Enclosure	+ 1 XE Expansion Enclosure	+ 2 XE Expansion Enclosures	+ 3 XE Expansion Enclosures	+ 4 XE Expansion Enclosures
Usable space (GB)	2764.48	5528.96	8293.44	11057.92	13822.41
Recommended inode ratio	2048	2048	4096	4096	4096
Number of frames	357663	714621	1071980	1426494	1784874
Hours of footage (hh:mm)	3:18	6:37	9:55	13:12	16:32

2K Film Workflows

The values in this table are for 2K 10-bit workflows with a frame size of 12746752 bytes at 24 fps.

	Single XR Enclosure	+ 1 XE Expansion Enclosure	+ 2 XE Expansion Enclosures	+ 3 XE Expansion Enclosures	+ 4 XE Expansion Enclosures
Usable space (GB)	2764.48	5528.96	8293.44	11057.92	13822.41
Recommended inode ratio	4096	4096	4096	4096	4096
Number of frames	232710	465121	698130	929049	1161312
Hours of footage (hh:mm)	2:42	5:23	8:05	10:45	13:26

4K Film Workflows

The values in this table are for 4K 10-bit workflow with a frame size of 50899872 bytes at 24 fps.

	2 XR Enclosures	+ 2 XE Expansion Enclosure	+ 4 XE Expansion Enclosures	+ 6 XE Expansion Enclosures	+ 8 XE Expansion Enclosures
Usable space (GB)	2764.48	5528.96	8293.44	11057.92	13822.41
Recommended inode ratio	4096	4096	4096	4096	4096
Number of frames	58206	116392	174616	232710	291027
Hours of footage (hh:mm)	0:40	1:21	2:01	2:42	3:22

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